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GENERAL MOTORS NORTH AMERICA
Structure & Safety Integration

USG 3685
May 31, 2002

Mr. Stephen R. Kratzke
Associate Administrator for Safety Performance Standards
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

Re: Tire Performance Upgrade

Dear Mr. Kratzke:

This letter provides General Motors comments to NHTSA's Notice of Proposed Rulemaking (NPRM) regarding tire selection and tire performance standards (Docket No. NHTSA-00-8011 published in the Federal Register on March 5, 2002, with corrections published on April 3, 2002). GM participated in the development of the Alliance of Automobile Manufacturers comments, and incorporates those Alliance comments to the extent that they do not conflict with those provided here.

SUMMARY OF GENERAL MOTORS VIEWS/RECOMMENDATIONS

General Motors' views and recommendations regarding the tire performance rulemaking are summarized as follows:

- The overall field performance of tires is outstanding. In the context of an estimated 2.7 trillion vehicle miles traveled each year in the U.S. (and a corresponding tire mileage accumulation in excess of 10 trillion miles), available data demonstrates that the contribution of tires to motor vehicle crashes and injuries is miniscule.
- The small role that tire failures do play in motor vehicle crashes is almost entirely attributable to under-inflation, overloading, and/or isolated tire defects. The isolated field failures of tires are not attributable to inadequacies of the existing Federal Motor Vehicle Safety Standards.
- Therefore, GM believes that the agency's initiatives to improve consumer understanding of the importance of tire inflation and wear, rulemaking to require tire pressure monitoring systems, and implementation of a database to enable early detection of isolated field issues have merit. In contrast, the tire performance amendments proposed in this NPRM are likely to yield minimal if any safety benefits, particularly once the other initiatives have been implemented, and may be counterproductive.
- In addition to GM's independent conclusion that NHTSA has significantly overestimated the potential benefits and underestimated the costs, the agency's own analysis and statements in the NPRM show that this proposed rulemaking would be among the agency's worst ever from a cost/benefit perspective.
- Recognizing that the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act compels NHTSA to update the tire performance standards, GM believes that some of the amendments proposed in the NPRM can appropriately be adopted in the near term. Other aspects of

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the NPRM simply do not address any demonstrated safety need. These unjustified aspects of the NPRM should be deferred until such time as the agency can show that they serve a safety purpose. With regard to tire selection criteria, GM supports NHTSA's proposal to extend the applicability of FMVSS 110 to include light trucks and multipurpose passenger vehicles (MPVs). However, the current provisions of FMVSS 110 requiring that the vehicle's normal load at each corner must not exceed 88% of the rated load of the tire at maximum inflation pressure should be preserved. In addition, the 1.1 derating of passenger car tires used in light trucks and MPVs should be preserved with respect to maximum loads, but not extended to the normal load condition.

- The road hazard impact test proposed in the NPRM is not appropriate and should not be included in the final rule. If the agency believes this test merits further consideration, additional research should be performed to establish appropriate test procedures, performance requirements, and safety relevance.
- GM agrees with the agency's reasoning for omitting temporary spare tires from the proposed new FMVSS 139. However, if FMVSS 109 is also deleted, temporary spare tires will not be covered by either FMVSS 139 or 109. We suspect this may be an oversight by the agency. Is so, GM recommends that the current (FMVSS 109) provisions applicable to spare tires be preserved at the conclusion of this rulemaking.
- GM recommends that the new tire performance requirements of FMVSS 139 and the tire selection requirements of FMVSS 110 become optional as soon as the final rule is published, and mandatory for original equipment vehicles as of September 1, 2007. This leadtime is needed to meet the dramatically more stringent tire performance requirements proposed in this NPRM, to complete the significant vehicle-level validation work made necessary by whatever tire changes follow from these requirements, and from any revisions to tire selection requirements.
- The provisions of FMVSS 139 should be mandatory only for tires that are installed on new (original equipment) vehicles. The current provisions of FMVSS 109 and 119 should remain optional to FMVSS 139 indefinitely with respect to tires produced for replacement purposes. The reason for this recommendation is that the tire construction changes needed to meet the new requirements of FMVSS 139 could have adverse vehicle-level effects if installed on vehicles that were originally matched to FMVSS 109/119 tire constructions.
- With regard to other aspects of the NPRM involving tire performance requirements, GM defers to tire manufacturers to evaluate the merits of the proposed amendments. As an overall recommendation, we encourage the agency to adopt changes that address a safety need, but to avoid or at least defer amendments for which no safety benefit has been shown. Before adopting new tire performance requirements, the agency should compare the field performance of tires that meet the proposed requirements to the field performance of tires which do not meet the proposed requirements. Such an analysis could provide an objective basis for deciding whether or not the proposed changes address a safety need. As another general recommendation, we encourage NHTSA to continue to the fullest extent possible the regulatory harmonization work that was well underway prior to the events leading to the TREAD Act and this rulemaking proposal.
- GM encourages the NHTSA and other regulatory agencies to identify the most effective, including cost effective, solutions to traffic safety issues. One example of how a broader view might be applied to tire safety involves aftermarket replacement parts. The tire selection requirements of FMVSS 110 and 120 apply only to new vehicles, even though the majority of an average vehicle's life is spent on replacement tires. It is incongruous from a societal safety standpoint to continually ratchet up the requirements applicable to original equipment while ignoring the appropriate matching of replacement tires. Another modest-cost countermeasure that could yield significant societal benefit would be for all gasoline service stations to be equipped with accurate tire-pressure gauges and air pumps.

The remainder of this letter discusses several of these topics in further detail.

COSTS & BENEFITS

The field performance of tires in service is excellent. The evolution of tire and wheel technology over the past fifty years has resulted in a high level of sophistication and robust performance for these key components. In the context of mileage accumulation exceeding 10 trillion miles per year, the field incidence of tire failure is minimal. This statement is not intended to trivialize the sometimes-serious consequences of the tire failures that do occur. Rather, the outstanding overall field performance of tires provides compelling evidence that the existing tire and tire selection FMVSS meet the need for motor vehicle safety. For the tire failures that do occur in service, there is general agreement that the underlying causes of these failures are under-inflation, vehicle overloading, and/or rare instances of tire defects. The TREAD Act and the NHTSA have identified certain actions that should mitigate some of these root causes of tire failures. These actions include enhanced consumer education regarding the importance of tire inflation and vehicle loading, rulemaking to require tire-pressure monitoring systems, and a database of field performance information that will improve NHTSA's ability to identify field issues early. In contrast, the proposed amendments of this NPRM reflect an overreaction to the TREAD Act that is likely to provide little if any safety benefit, particularly once the more relevant initiatives are implemented.

The Alliance comments contain a broader critique of the agency's estimates of the safety benefits expected from this rulemaking. A key finding of the Alliance review is that many unfounded assumptions were used by NHTSA in developing the benefits estimates. The agency itself acknowledges as much in the NPRM, noting the extremely aggressive timetable specified in the TREAD Act for completing this rulemaking, and also the inherent difficulties of estimating the benefits of crash avoidance countermeasures. While the use of unfounded assumptions in estimating benefits does not per se mean that those estimates are wrong, there are good reasons to believe that the estimated benefits of this particular rulemaking are grossly exaggerated. As previously mentioned, these reasons include the adequacy of the existing FMVSS as demonstrated by the excellent overall field performance of tires, and the fact that the root causes of the vast majority of tire failures are already being addressed by other more relevant actions. The TREAD Act does not excuse the agency from its obligation to observe sound science and the legal framework supplied by the Safety Act and general principles of administrative law.

In addition to overestimating benefits, the Preliminary Economic Assessment (PEA) significantly underestimates the costs of the proposed regulatory changes. The agency's cost estimates are essentially limited to the unit price increase required to produce tires that comply with the more stringent tire requirements. Our informal discussions with tire suppliers suggest that the agency's cost estimates for producing compliant tires are too low; however, we defer to tire manufacturers to comment on the tire costs. The point for purpose of these comments is that the agency's cost estimates do not comprehend the significant vehicle-level costs associated with this proposed rulemaking. For example, GM has analyzed its current production vehicles with respect to the revised tire selection requirements proposed in the NPRM. This analysis shows that approximately 22% of GM's 2002 model year passenger car volume does not meet the proposed tire selection criteria. In addition, approximately 6% of GM's 2002 model year light truck and MPV volume does not meet the proposed tire selection criteria. (The details of this analysis can be made available separately upon request. It is noteworthy that the proposed tire selection requirements affect nearly four times as many cars as trucks, even though this rulemaking was instigated by a concern over SUV tires.) For vehicles that do not meet the proposed tire selection requirements, it will be necessary to increase the recommended inflation pressure, release higher load range tires, and/or release larger tire sizes. For a limited number of vehicle models, it may be necessary to redesign vehicle architectures to accommodate the larger tire/wheel assemblies. The cost of changing a vehicle's architecture is measured in tens if not hundreds of millions of dollars. Other vehicle-level costs that the PEA ignores are those required to revalidate the new tire constructions to existing vehicle models, re-certify brake system performance, revise antilock brake system (ABS), traction control system (TCS) and electronic stability control (ESC) algorithms, redevelop suspension characteristics for acceptable ride and handling, and fuel economy penalties resulting from higher rolling-resistance tires. Regarding this last

item, GM has used preliminary information provided by tire suppliers to predict the fuel economy penalties that could result from the proposed FMVSS 139. Based on input from tire suppliers, GM has estimated that approximately 37.5% of the tires used on GM light-duty vehicles would experience a 10% increase in rolling resistance, 37.5% would experience a 5% increase in rolling resistance, and 25% would experience no change in rolling resistance. Based on these estimates, GM predicts a 0.21 mile/gallon fuel economy penalty across our U.S. passenger car fleet and a 0.16 mile/gallon penalty across our light truck fleet. These cumulative costs at the vehicle level are dramatic, yet largely omitted from the PEA. And it is important to remember that these costs will not be borne by tire or vehicle manufacturers; rather, they will be passed through to consumers. GM believes that consumers will not be getting their money's worth for many aspects of this NPRM.

Against this backdrop of minimal if any safety benefit from the proposed amendments combined with the high price that consumers will be required to pay, GM believes that the scope of the NPRM is excessive. Even if the cost and benefit estimates contained in the NPRM were accurate, the agency acknowledges that this rulemaking is among its worst ever from a cost/benefit perspective. Rather than increasing the stringency of existing requirements and piling on new requirements in the hope that some safety benefit may result, GM encourages the agency to limit near-term regulatory changes to those which are justified. While the TREAD Act does require the agency to update tire performance requirements, it is silent with regard the specific changes that should be made, and says nothing about changing the tire selection provisions of FMVSS 110 and 120. In view of the statutory flexibility provided in the TREAD Act, there is no necessity for the agency to force unjustified amendments. With respect to aspects of the NPRM that are not justified, the agency should exercise its discretion to either drop or at least defer rulemaking until such time as the safety relevance of those revisions may be demonstrated.

TIRE SELECTION CRITERIA

General Motors supports the agency's proposal to extend the applicability of FMVSS 110 to include light trucks and MPVs. However, the current provisions of FMVSS 110 stipulating that the vehicle's normal load at each corner must not exceed 88% of the rated load of the tire at maximum inflation pressure should be preserved. In addition, the 1.1 derating of passenger car tires used in light trucks and MPVs should be preserved with respect to maximum loads, but not extended to the normal load condition.

As mentioned in the preceding section, GM has determined that approximately 22% of its car and 6% of its light truck volumes would not comply with the proposed tire selection criteria. It was a significant undertaking to complete this analysis for 2002 model year vehicles, and we have not yet had time to evaluate future-model vehicles. Our expectation, however, is that a similar percentage of already designed future vehicles would need to be changed. There is no safety justification to require such wholesale changes in the matching of tires to General Motors' vehicles. Accordingly, while we support extending the applicability of FMVSS 110 to light trucks and MPVs, we strenuously object to the proposed change from 88% to 85%, the change from maximum inflation pressure to recommended inflation pressure, and the application of the 1.1 derating to the normal load condition. Our position rests on the following foundation:

- First and foremost, there is no safety justification for the tire selection amendments proposed in the NPRM, and no objective evidence that they will yield any safety benefit.
- The agency's own research found no correlation between tire failure rate and reserve load percentage. (See "The Relationship Between Tire Reserve Load Percentage and Tire Failure Rate" as discussed in 46 FR 47100.) While this agency research is over twenty years old, GM is unaware of any more recent analysis, and has no reason to believe that a new analysis would show anything different. Certainly, NHTSA has not suggested any.

- The 88% figure was never intended as a mechanism to provide reserve load. It is generally understood that this 88% number was intended to adjust the laboratory test procedure to driving on the road. Therefore, the revision of 88% at the maximum inflation pressure to 85% at the recommended inflation pressure for the indirect purpose of increasing reserve load would distort the original intent of this percentage figure. The agency has previously considered and rejected a change from 88% to 85%. (See 46 FR 61477 published on December 17, 1981.) It should do so again. In addition, GM does not believe that there is rationale or justification to link the high-speed tire test and the tire selection criteria requirements. NHTSA has not provided any justification why the tire selection criteria should be linked to the high-speed test or any other test such as the endurance test, for example. Accordingly, GM recommends that the tire selection criteria not be linked to the load used in the high-speed test.
- The 1.1 derating that currently applies to the maximum load condition when P-metric tires are used in light truck applications is appropriate and should be preserved. There is no reason, however. to adopt this derating at the normal load condition. The 1.1 derating is intended to comprehend the more severe duty cycle that may be experienced by passenger car tires in "work" vehicles such as pickup trucks. These vehicles are sometimes heavily loaded and driven off-road. Such severe usage corresponds to the maximum load condition of the vehicle. It is self-evident that the normal load condition is not a severe-duty condition, and therefore it is unnecessary and inappropriate to apply the 1.1 derating to normal load requirements.
- The changes that would be needed to meet the tire selection criteria proposed in the NPRM could have unintended consequences. There is no doubt, for example, that the higher recommended inflation pressures would have adverse consequences on vehicle ride performance. The changes could also have adverse handling implications. In addition, the increases in static-loaded radius of the tire/wheel assembly would be directionally wrong with respect to the parking brake and failed power assist requirements of FMVSS 135. These adverse consequences could significantly overwhelm whatever speculative safety benefits the proposed amendments are intended to provide.

For these reasons, General Motors encourages the agency to extend the applicability of FMVSS 110 to include light trucks and MPVs, but to otherwise preserve current requirements for tire selection criteria.

ROAD HAZARD IMPACT TEST

For the majority of tire performance tests, GM defers to tire manufacturers to provide the most meaningful comments on the merits of the proposed amendments. With respect to the proposed road hazard impact test, however, GM does wish to comment since we were the leaders in developing this test and in writing the SAE Recommended Practice J1981 on which it is based. Specifically, GM recommends that the proposed road hazard impact test not be included in the final rule. If the agency believes this test merits further consideration, additional research should be performed to establish appropriate test protocols, performance requirements, and safety relevance. Any rulemaking involving this test should be deferred until these critical issues are evaluated and resolved. The proposed road hazard impact test should not be included in FMVSS 139 for the following reasons:

- GM has recently conducted a test program to evaluate the road hazard impact test protocol proposed in the NPRM. In contrast to the agency's testing, the GM testing included a broader spectrum of tire/wheel assemblies, including low section-height tires. GM duplicated the agency's three different pendulum drop angles of 60°, 80°, and 100°. This testing showed that damage occurs to wheels, not tires. At 100°, many of the wheels deformed to the point of losing tire inflation. At 80°, some of the wheels deformed to the point of losing tire inflation, particularly for those assemblies with lower aspect ratio tires. At 60°, some of the wheels having the lowest aspect-ratio tires (which were not included in the agency's testing) deformed at the wheel flanges. There was no visible tire damage resulting from

any of this testing, even though many of the assemblies did lose inflation pressure due to wheel deformation. Subsequent shearography analysis did show trace amounts of anomalies; however, these slight anomalies were present both at and away from the areas of pendulum impact. Since pre-test shearography was not performed, it is unknown whether or not the pendulum impacts caused any of these anomalies. What is known is that any anomaly from the pendulum impacts was undetectable by visual inspection and minimal at most.

- This GM testing confirms that SAE J1981 is a wheel test, not a tire test. It was designed for the purpose of evaluating a wheel's ability to withstand potholes and other road anomolies. The NPRM does not discuss, nor is GM aware of any safety need to adopt new wheel performance requirements as part of this rulemaking.
- The NPRM does not indicate whether production wheels versus a laboratory wheel are to be used for the proposed hazard impact testing. As described above, using production wheels simply means that the wheels may be damaged, but not the tires. An alternative that would be more likely to result in tire damage would be to specify that a rigid laboratory wheel be used for the testing. It is possible that the use of a rigid wheel would cause some tires – particularly lower aspect ratio tires – to bottom out and be cut along the wheel flange. (If a laboratory wheel were specified for this testing, the specified contour of the flange would of course be crucial to the likelihood of tire damage.) While specifying a rigid laboratory wheel for this testing might increase the likelihood of tire damage, it would also virtually eliminate any field relevance of such testing since the laboratory wheels are much stiffer than actual wheels used on vehicles.
- The use of a single pendulum drop height is not appropriate given the physics of road hazard interactions with tire/wheel assemblies. When an actual vehicle hits a pothole or other road anomaly, the energy transmitted to the tire/wheel assembly is a function of several factors, including road hazard geometry, vehicle velocity, and vehicle mass. While hazard geometry and vehicle velocity may generally be standardized for purposes of a test procedure, vehicle mass is unique to each vehicle. It is not appropriate to apply the same requirements to a tire/wheel used on a 3,000 pound vehicle as to a tire/wheel used on a 10,000 pound vehicle. This is why SAE J1981 does not specify pendulum heights (and corresponding energy impact levels). Any singular pendulum drop height (e.g., the 80° height proposed in the NPRM) will inevitably be too severe for some tire/wheel assemblies and/or too lenient for other tire/wheel assemblies, depending on the vehicle application. Stated differently, for a given level of performance on the proposed road hazard impact test, a given tire/wheel assembly may be entirely suitable for some vehicle applications and unsuitable for other vehicle applications.

LEADTIME

General Motors recommends that the new tire performance requirements of FMVSS 139 and the tire selection provisions of FMVSS 110 become optional as soon as the final rule is published, and become mandatory as of September 1, 2007. This recommendation of significantly more leadtime than what the agency has proposed in the NPRM and its supplement is essential to address a number of practical considerations that the NPRM has ignored.

The first involves the multiple and intertwined uncertainties associated with this rulemaking. It is not yet known, for example, what the content of the final rule will be. While the NPRM itemizes proposed amendments, the agency has also indicated that it is continuing to conduct research in several areas. The actual rule is also likely to be revised from the NPRM based on comments that the agency receives. The next level of uncertainty involves the number of tires that will have to be redesigned, the specific design changes that will be required to meet the new tire performance requirements, and the amount of time that tire manufacturers will need to validate and implement these new designs. The next unknown involves a number of important vehicle-level effects. There is little doubt that these new tires will require new matching of tires to vehicles, affect ride and handling, affect brake system performance, require revisions

to ABS/TCS/ESC control algorithms, affect fuel economy performance, etc. But the magnitude of these vehicle-level effects and the specific vehicle models that will be most affected cannot be determined until tires meeting the new requirements of FMVSS 139 are available. The component and vehicle-level product implications of this NPRM are among the most uncertain of any rulemaking that the agency has undertaken.

Another complicating factor of this rulemaking as it affects leadtime is the interdependency between tires and vehicles. Obviously there is a lag between the time when complying tires can be produced and the time when those tires can be validated for use on specific vehicles. This intervening time is required to accomplish the vehicle-level validation previously described; i.e., tire matching to the vehicle, brake system certification, ride and handling development, etc. The intervening time required between tire availability and vehicle production can vary from six months (to simply conduct the validation testing) to two years (if the validation testing reveals needed design changes to the brake or suspension systems, for example). Since complying tires must be available prior to complying vehicles, one might assume that the effective date for the new FMVSS 139 requirements could precede the effective date for the new tire selection requirements. This is not the case, however, since tire manufacturers cannot begin volume production of complying tires until suitable vehicle applications for those tires have been validated. Suppose, for example, that a period of three years is required to redesign a particular tire to comply with FMVSS 139, and that an additional one year is needed to validate that tire in a particular vehicle application. In this example, the tire manufacturer would provide samples of the new tire to the vehicle manufacturer at the three-year point for purposes of vehicle validation. But the tire manufacturer could not begin volume production of that tire until the vehicle validation was complete, since there would be no use for that tire prior to then. In other words, the tire and vehicle effective dates must coincide.

As mentioned earlier, there are a number of potentially adverse consequences that may result from this rulemaking, including ride & handling, brake system performance, fuel economy, noise and vibration, etc. The recommended leadtime will enable vehicle manufacturers to mitigate these adverse consequences by providing sufficient opportunity to quantify the vehicle-level effects and make changes where appropriate to other subsystem designs. Particularly since the safety benefits of this rulemaking are so speculative, the agency should avoid effective dates that leave inadequate time to address potential problems in other areas.

In fact, there is a relevant precedent for the five-year leadtime that GM recommends; namely, FMVSS 135. When the new brake standard FMVSS 135 was issued, the agency allowed a five-year transition period during which manufacturers could certify brake systems to either FMVSS 105 or 135. At the end of the five-year period, FMVSS 135 became the required standard. Since it is literally true that vehicle braking is achieved where the rubber meets the road, it is possible that the tire and tire selection changes proposed by this rulemaking could have implications on braking performance comparable to those associated with the transition from FMVSS 105 to 135. This cannot be stated with certainty, since the required tire changes and their effects on braking performance are not yet known. Nevertheless, the necessity to revalidate brake system performance and ABS/TCS/ESC algorithms alone justifies the five-year leadtime that GM recommends.

The agency may receive comments from others urging aggressive phase-in date(s) for the new requirements of this rulemaking. Such comments are typically submitted by parties who bear no responsibility for doing the work required to meet new regulatory requirements. As it weighs the pros and cons of various leadtime alternatives, GM encourages NHTSA to recognize that vehicle manufacturers actually will have far more incentive to frontload, rather than backload, the phase-in of these new provisions. For one thing, the tremendous uncertainties associated with this rulemaking will make it incumbent on manufacturers to discern and deal with the effects as quickly as possible. Failing to move expeditiously to meet the requirements could place vehicle production at risk, a situation that manufacturers are highly motivated to avoid. Another forcing function is the fact that the human and

facilities resources available for design and validation will need to be spread across the transition period to accommodate the volume of work that may be required. Manufacturers also will be motivated to get the workload associated with this rulemaking accomplished so that the resources can be freed for other design and development work.

In summary, the leadtime that GM proposes is well justified for two fundamental reasons. The first is that there are many significant unknown implications of this rulemaking at both the component and vehicle level. The second justification is to allow manufacturers sufficient opportunity to identify and mitigate the potential adverse implications of this rulemaking, particularly since any safety benefits are highly speculative.

If you have any questions regarding these comments, please contact Bhupen Shah (586-986-2145), Steve Gehring of our Washington office (202-775-5071), or me (586-947-0149).

Sincerely,

Louis J. Carlin, Director
Safety Regulations and Consumer Information

cc: Mr. George Soodoo, Office of Crash Avoidance Standards
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